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synthetic molecular sieves, acid ion exchange resins, acid treated clays and acid treated calcined clays, and wherein said metal chlorite and said acid forming component are such that they will react with each other in the presence of water but not in the substantial absence of water to produce chlorine dioxide, said membrane being comprised of a material which permits: (a) the controlled passage of liquid water and/or water vapor to pass through the membrane into the enclosed space to thereby allow the metal chlorite and the acid forming component to react to produce chlorine dioxide and (b) the so produced chlorine dioxide to pass through the membrane into a body of liquid water to produce the aqueous solution of chlorine dioxide.

Remarks

In the Office action, the Examiner rejected claims 26-59 under 35 U.S.C. §112 paragraph 2 for indefiniteness. The Examiner stated on page 2 of the action that "In claim 26, it is unclear if the 'liquid water and/or water vapor' and the 'body of liquid water to produce the aqueous solution of chlorine dioxide' are part of the claimed device." Applicants disagree and believe that it is abundantly clear from the specification that the invention being claimed is a device which when placed into a body of water will generate chlorine dioxide which thereafter dissolves in the body of water to produce an aqueous chlorine dioxide solution. The water is therefore not a component of the claimed device. Support for Applicants' position may be found in the specification, for example, at: page 9, lines 9-17; page 9, line 20 through page 10, line 3; page 10, lines 6 through 15; page 11, line 18 through page 12, line 4; page 12, lines 5 through 15 and page 12, line 20 through page 13, line 18.

However, in order to advance the prosecution, Applicants have amended claim 26 (all other claims ultimately depend from claim 26) to make it clear that the device is added to a body of water and therefore the body of water is not a component of the claimed invention. No new matter has been added and no additional search is required because of this amendment.

The Examiner further rejected claims 26, 28-34, 39-40 and 48 under 35 U.S.C. §102(b) over the Derwent English abstract No. 1997-311,227 of Chinese published patent specification 1104610A (“Derwent Abstract”).

Applicants respectfully traverse this rejection for the reasons discussed below.

First of all, it is very clear from this reference that the inventors believed that the sodium chlorite reactant had to be in the form of micro capsules whose encapsulation material was chosen from Chinese wax, stearic acid, bees wax or paraffin wax; see (i) and (ii) of the Derwent Abstract. The Examiner recognizes this requirement in the Office action on page 3 at lines 2-3 and on page 4, lines 1-2. A common dictionary meaning of the word “capsule” (micro capsule being a small capsule) is “to enclose in or furnish with a capsule,” see for example Webster’s II, New College Dictionary, Houghton Mifflin Company, copyright 1995, page 165, column 2, line 5-6 from the bottom.

One skilled in the art would recognize that this means that a material of interest (here the chlorite reactant) is enclosed, coated or encased in some other material (here Chinese wax, etc.) for some specific reason (here, putatively, to prevent contact and premature reaction between the reactants).

Nowhere in the pending claims is there a requirement or even a suggestion for forming capsules which contain the metal chlorite reactant. Further, there is no discussion in the specification that the metal chlorite reactant needs to be encapsulated. In fact, other than for drying, the specification does not discuss treating the metal chlorite in any way prior to its inclusion in the device.

The Examiner concludes this portion of the rejection in the second full paragraph on page 3 by stating “The bag containing the mixture of wax, sodium chlorite and tartaric acid as disclosed in CN ‘610 anticipates the claimed device.” In point of fact, the bag does not simply contain a “mixture of wax, sodium chlorite and tartaric acid.” The bag contains a mixture of tartaric acid and sodium chlorite that has been encapsulated in wax for the inventors’ purposes.

Thus, the claimed device is novel in view of the Chinese reference and this rejection cannot stand.

The Examiner also rejected claims 49-59 under 35 U.S.C. §103(a) as being unpatentable over the Derwent Abstract. This rejection is also traversed.

The Examiner states in the second full paragraph on page 4 of the rejection “However, the microcapsules as disclosed in CN ‘610 can be considered as tablets, powders, granules, pellets or agglomerates depending on its size and shape, especially because a wax (i.e. a binder) was used. It would have been obvious to one ordinary skill in the art to optimize the size of the microcapsules of CN ‘610 in order to obtain the best results”.

On page 19, lines 7-12 of the specification, Applicants state that the solid reactants can be in any physical form, e.g., powders, granules, pellets, tablets and agglomerates. These physical forms cannot properly be equated with the microcapsules of the reference as the Examiner attempts to do. As previously explained, the microcapsules of the reference result from purposefully coating the chlorite reactant with e.g., wax to form an encapsulated reactant. The enumerated physical forms of Applicants’ reactants are not coated and therefore not microcapsules rather they are merely different shapes and sizes of the particles which comprise Applicants’ reactants in bulk form. Those skilled in the art would know how to prepare these different physical forms, e.g., tablets from smaller particles by pressure compaction, powders by crushing larger particles, etc. The Examiner’s reference to use of a wax binder (assumedly from the specification at page 19, line 17) is here inapposite. Those skilled in the art recognize that binders may be used when one desires to produce tablets, e.g., in a tableting punch press. The tablets so produced are not coated by the wax and thus are not encapsulated. Coating of such tablets by the wax tableting agent would be a negative design since e.g., a tablet so produced containing a pharmaceutical agent would not readily dissolve and thus not release the pharmaceutical agent upon ingestion by a person in need thereof. Thus, the microcapsules of the reference are not the same as Applicants’ tablets, powders, granules, pellets or agglomerates.

Applicants have also amended claim 26 to distinguish the membrane of the invention from the cloth bag of the reference. Thus, the membrane is now described as permitting the controlled passage of water therethrough.

This amendment is supported in the specification at: page 9, lines 13 through 14; page 12 at lines 11 through 15; page 13, lines 7 through 10 and page 20, line 25 through page 21, line 5. No new matter has been added and no additional search is required because of this amendment.

The Examiner states in the fourth full paragraph on page 5 of the action, that “The language of ‘containing’ in Applicants’ claims do not exclude the presence of the wax or any additional material disclosed in CN ‘610, it should be noted that the presence of additional material beside the chlorite and the acid forming component, such as paraffin wax tableting binder, is allowed in Applicants’ claimed invention (note page 19, lines 13-27)”. Applicants urge that they need not limit their claims to exclude the additional materials disclosed in the Derwent Abstract since these additional materials are disclosed in the reference as encapsulating agents. As discussed above, Applicants reactants are not encapsulated and the claimed devices may optionally include certain standard additives, e.g., wax as a tableting agent.


To conclude, Applicants have avoided the prior art requirement of encapsulating the chlorite reactant in their claimed device.

It is not understood why the Examiner believes that the avoidance of this requirement would have been obvious to one skilled in the art. Surely the inventors of the Derwent Abstract reference were skilled in the art and it was not obvious to them that their chlorite reactant did not require encapsulation. If the Examiner should persist in the current U.S.C. §103(a) rejection, Applicants respectfully request the Examiner to put forth reasons why it is believed that the avoidance of encapsulation and the required extra processing steps would have been obvious.

A marked up copy of amended claim 26 is attached as an exhibit hereto.

It is believed that the claims are all allowable and an early notice to that effect is respectfully requested.

Respectfully submitted,


Stephen I. Miller
Reg. No. 27,927

Engelhard Corporation
101 Wood Avenue
P. O. Box 770
Iselin, NJ 08830-0770
(732) 205-5181

EXHIBIT A
Version with markings to show changes made

Claim 26. (Amended) A device for producing an aqueous solution of chlorine dioxide when said device is placed into a body of water, comprising a water-permeable membrane defining at least in part an enclosed space containing a mixture of at least one metal chlorite and at least one acid forming component, said acid forming component being selected from the group consisting of water soluble acids, water soluble acid salts, synthetic molecular sieves, acid ion exchange resins, acid treated clays and acid treated calcined clays, and wherein said metal chlorite and said acid forming component are such that they will react with each other in the presence of water but not in the substantial absence of water to produce chlorine dioxide, said membrane being comprised of a material which permits: (a) the controlled passage of liquid water and/or water vapor to pass through the membrane into the enclosed space to thereby allow the metal chlorite and the acid forming component to react to produce chlorine dioxide and (b) the so produced chlorine dioxide to pass through the membrane into a body of liquid water to produce the aqueous solution of chlorine dioxide.